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ABSTRACT

A study examined what effect, if any, vision training exercises had on reading achievement. It was hypothesized that training students to control more accurately the speed and direction of their eye movements would improve their visual skills. However, it was also hypothesized that a more efficient visual system would have no effect on reading achievement. Subjects, 24 New Jersey fifth-graders, were randomly divided into an experimental group or a control group. The experimental group was given worksheets with activities designed to improve ocular-motor skills. Both groups were administered pretests and posttests. Results indicated significant improvement in the ocular-motor and visual-motor skills of the experimental group and also showed significant gains in the reading performance of those same students. Thus, the first hypothesis was supported, while the second was not. Findings suggest that a more efficient visual system could have a positive effect on the reading achievement of fifth grade students. (A review of visual training and reading research, as well as 17 references are included. Test scores and worksheets are appended.) (NKA)

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THE EFFECTS OF VISUAL TRAINING ON THE READING ACHIEVEMENT OF FIFTH GRADE STUDENTS

By

Roberta A. Lynch

Submitted in partial fulfillment of
the requirements for the Master of Arts Degree

Kean College of New Jersey

May, 1987

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ABSTRACT

This study involved twenty-four normal fifth grade students. It was hypothesized that training students to more accurately control the speed and direction of their eye movements would improve their visual skills. It was also stated that a more efficient visual system would have no effect on reading achievement. The students were divided into an Experimental Sample and a Control Sample. The Experimental Sample only was given worksheets with activities intended to improve ocular-motor skills. The materials were distributed approximately three times a week over a period of eight weeks.

The results of the pre and post-test scores of the New York State Optometric Association K-D Test and the Michigan Tracking Test showed significant improvement in the ocular-motor and visual-motor skills of the Experimental Sample. Data obtained from the pre and post-test scores of the California Reading Tests, Level 3, also showed significant gains in the reading performance of the Experimental Sample. An analysis of the data obtained in this research indicates a possible correlation between efficient visual performance and the reading achievement of normal fifth grade students.

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Children labeled mild to severely disabled comprise about 10 to 15 percent of the student population. Once identified as reading disabled, the student is usually placed in special classes and/or reading programs designed to remediate their obvious deficiencies. However, the problems of the majority of students who experience inadaquacies in reading are not always as glaring, or easily recognized as causative factors in reading failure. There are "border line" students found in most classrooms. These are the slow learners and poor readers who never are exposed to the battery of tests which are used to ascertain the root causes of the deficiencies of those labeled "learning disabled."

Some of the behaviors readily observable in students with reading difficulties are frequent loss of place when reading, regressions, omissions, sentence skipping, substitutions, head movement, and finger pointing, all of which are symtomatic of poor ocular-motor efficiences. There are other areas of concern which are not as obvious, but which are also related to dysfunctional eye movements. These are short attention spans and an increase in restlessness and fatigue which can be experienced by some students when required to do sustained visual activities. Seiderman (1979) According to Weber (1980), studies show that inaccurate ocular pursuits and problems in two-eye teaming coorelate highly with classroom performance. It can be concluded therefore that students who have problems

with ocular-motor functioning will not experience the same degree of success as those with an efficient visual system.

The relationship between eye movement skills and reading achievement has been of interest to those concerned with reading performance for many years. In his article which reviewed research on eye movements in reading, Tinker (1985), commented negatively on what he termed the "mistaken notion" still adhered to by some writers, that "training eye movements as such is an effective way to improve reading." Evidently there were, and still are, those who adhere to that "mistaken notion", for according to the literature, research is still being conducted to find support for that position. Some of the variables compared in studies are: speed of reading, number of fixations, lengths of saccades, and number of regressions. Methods which require subjects to visually follow lights, have also been used to measure eye tracking abilities.

When commenting on the eye movement dynamics of good and poor readers, Lefton, Nagle, Johnson and Fisher (1979), said that "the eye movements of poor reading children are chaotic, frequent, of longer duration, and generally, unsystematic." It was also stated that they were "severely hampered by the chaotic ocular-motor control." Activities have been developed, and used by supporters of Optometric Vision Therapy, which have as their purpose the improvement of eye movement skills. Solan (1985) reported the case histories of three students who "showed significant

improvement in visual functioning and reading efficiency as measured by eye-movement recordings after a brief period of visual training." Studies completed by Punnett and Steinhouer (1984), in which four reading disabled children were given ocular motor training with reinforcement, demonstrated that "using reinforcement to train ocular-motor skills can improve those skills, which in turn elevates reading performance. An opposing opinion is expressed by Rayner (1985). In reviewing the role of eye movements in learning to read and reading, he stated that "there is no evidence for the assumption that training eye movements of beginning or disabled readers will enable them to read more effectively." As evidenced by this small sampling of the literature, there is still much controversy as to whether or not vision training, specifically designed to improve eye movement skills, will have any carry over effect on reading achievement. Since there is such a wide difference of opinion on this issue it is obvious that additional research is necessary.

It is generally agreed that the ability to move one's eyes smoothly and efficiently along a line of print is a prerequisite skill necessary in reading achievement, and requires the efficient functioning of the ocular-motor system. As previously stated, behaviors such as omitting words, and losing one's place while reading are symtomatic of a deficiency in eye movement skills. It is assumed that training children to more accurately control the speed

and direction of their eye movements, through methods used in Optometric Vision Therapy will, based on the length and intensity of the program, change the symtomatology. If a positive change does occur, the student no longer hampered by "chaotic ocular-motor control" will be more visually prepared to achieve in reading. It is further assumed that if a student's reading difficulties were caused by a deficiency in eye movement skills, reading performance may improve as eye movement skills improve.

Assumptions need verification. With that purpose in mind, this study has been developed to determine what effect if any, vision training activities will have on reading achievement. If there is a correlation between efficient eye movement abilities and reading achievement educators need to know.

HYPOTHESIS

The ability to move one's eyes smoothly along a line of print is a prerequisite skill necessary for reading achievement and requires the efficient functioning of the ocular-motor system. Training children to more accurately control the speed and direction of their eye movements will improve their visual abilities. However, it is hypothesized that a more efficient visual system will have no effect on reading achievement.

DEFINITIONS

Developmental Optometry - the combined disciplines of psychology, neurology, child development, learning theory, and other related fields which stress the vision/learning model as it develops from birth.

Eye Tracking - the ability of the eye to smoothly and effortlessly follow a moving object and to aim the eyes from one point to another. For the purposes of this study, eye tracking is also defined as the ability of the eye to smoothly and effortlessly move along a line of print.

Oculomotor (ocular-motor) - eye movement; the searching or scanning sub-system, which serves to gather information.

Optometric Vision Therapy - an individualized program directed at treatment of specifically diagnosed vision conditions.

Pursuits - continued fixation on a moving object; tracking.

Saccades - rapid moving of eyes from one fixation to another; scanning.

Vision - the learned process of deriving meaning from what you see.

Visual Motor - eye hand or eye body coordination.

Visual Therapy/Visual Training - the art and science of developing, enhancing and remediating visual abilities to achieve optimal visual performance, efficiency and comfort.

ASSUMPTIONS

It was assumed that the students participating in the experiment would complete the activities necessary to carry out the research project.

PROCEDURES

The participants in this study were 24 fifth-graders from the middle class community of Roselle Park, New Jersey. The age of the students averaged 10.6 years. Using a list of random numbers, the students were divided into two groups, an experimental group and a control group.

All the students were individually tested with the New York State Optometric Association K-D Test of eye-tracking abilities. This is a timed test, the purpose of which is to measure in tenths of a second, the time it takes for a subject to read aloud across a line of numbers. The students were shown four King-Devick Test Cards, one at a time. The first card was a demonstration card used to provide practice. The numbers on each of the next three test cards are positioned in such a way as to make it increasingly more difficult to read across the line of numbers without losing one's place. The time in tenths of a second it took each individual to read each card shown, and the number of errors made, if any, were recorded. The total time it took the students to read all three cards was used to determine the Experimental and Control Sample's K-D score.

A Michigan Tracking Sheet was also used as a test instrument but only with the students in the experimental group. The task required scanning along lines of print organized in such a way as to appear to be sentences and paragraphs and circling letters of the alphabet in sequential order. This activity is also timed and administered individually. The speed and accuracy of performance was noted.

The California Reading Test, Level 3, Form A vocabulary and comprehension sub-tests were administered to both groups collectively, as a pre-test to determine reading achievement.

Following the initial testing the students in the experimental group were supplied with worksheets, the purpose of which was to improve their ocular-motor functioning. The students spent approximately 15 minutes a day, 3 days a week for 8 weeks completing the activities. The work sheets were divided into sets of three different activities. Each set included either hidden pictures or hidden words, Michigan Tracking sheets, and/or Saccadic (Sacc) Search sheets. Printed on the Sacc sheets are letters and/or letters and numbers, randomly placed. The students are required to circle all designated letters and/or numbers, scanning from left to right and from the top to the bottom of the page. Also included in each set was a Groffman work sheet, on which was drawn intertwining lines to connect letters on the right side of the paper to numbers on the

left. The task is to follow the lines with one's eyes from the letter where it starts to the number where it ends. The students were instructed not to trace the lines with their finger or pencil, but to use their eyes only. Head movements were also discouraged.

In order to reduce the possibility of the subjects becoming anxious over their visual abilities, they were not told the exact purpose of the study. They were told that the purpose of the study was to assess the educational value of the materials they were using.

The materials were distributed to the subjects in the experimental group approximately 3 times a week. The activities were explained and the previously completed work collected. The students were also given an opportunity to discuss the activities whenever time allowed. The students daily schedule did not permit the setting aside of a specific time period in which to complete the assignments. However, they were permitted to do the work during whatever free time they had each day. The students in the control group were not assigned any additional activities. They worked on their day assignments, reading workbook pages, math, etc.

At the end of the 8 weeks of training, post-tests were administered. All the subjects in both the experimental group and the control group were individually tested with the K-D Test, and their scores were recorded. The average score for each group was then compared to ascertain

if the practice in eye-tracking had resulted in improved performance. The same Michigan Tracking sheet used in pre-testing was given to the students in the experimental group again as a post-test. Each subject was individually tested. The amount of time it took the student to scan along a line of print to locate and circle specific letters was recorded. Pre and post-test scores were compared to determine if training improved visual-motor and scanning abilities. The California Reading Test, Level 3, Form B vocabulary and comprehension subtests were administered to both groups collectively, to assess reading achievement. The results were recorded and compared with pre-test scores, to determine what effect, if any, eye-movement training had on the reading achievement of the fifth grade students in this study.

RESULTS

In Table I the Mean, Standard Deviation, and t of the K-D pre-test scores of the Control and Experimental Samples are compared. Although the Control Sample shows a slight advantage, there is no significant difference between the Mean score of .6248 seconds of the Experimental Sample when compared to the Control Sample's Mean of .5718 seconds.

Table I

Pre-Test Scores of the Control and Experimental Samples on the K-D Test

	Mean	Standard Deviation	t
Experimental Sample	.6248	.0557	1.80
Control Sample	.5718	.0790	

Non-Significant

In Table II the Mean, Standard Deviation, and t of the post-test scores of the Control and Experimental Samples are compared. According to the analysis shown, there is no significant difference between the Experimental Sample's Mean Score of .5692 seconds and the Mean Score of .5703 seconds of the Control Sample.

Table II

Post-Test Scores of the Experimental Sample and the Control Sample on the K-D Test

	Mean	Standard Deviation	t
Experimental Sample	.5692	.0650	.03
Control Sample	.5703	.0960	

Non-Significant

Table III compares the Mean, Standard Deviation and t of pre and post-test scores of the Experimental Sample on the K-D Test. The data obtained shows significant

Table III

Pre and Post-Test Scores of the Experimental Sample on the K-D Test

	Mean	Standard Deviation	t
Pre-Test	.6248	.0550	2.28
Post-Test	.5692	.0650	

Significant < .05

improvement in the score of .6248 seconds before visual-motor training as compared to the score of .5692 seconds after training. As noted the difference between the means was significant below the .05 level.

Table IV compares the Mean, Standard Deviation and t of the pre and post-test scores of 9 of the 12 students

Table IV

Pre and Post-Test Scores of the Experimental Sample on the Michigan Tracking Test

	Mean	Standard Deviation	t
Pre-Test	.7840	.3400	1.46
Post-Test	.5550	.2700	

Non-Significant

in the Experimental Sample on the Michigan Tracking Test. Three of the students were not tested on the same day as the others, therefore their scores were not included. An examination of the data reveals that although there is improvement in the post-test score of .555 seconds when compared with the pre-test score of .784 seconds the mean difference .229 is not statistically significant.

In Table V the Mean, Standard Deviation and t of the pre-test scores of the Control Sample and the Experimental Sample shows no significant difference between the groups in reading achievement, as measured by the Vocabulary and

Table V

Pre-Test and Post-Test Scores of the Control and Experimental Samples on the Total Reading Scores of the California Achievement Tests, Level 3, Forms A & B

Sample	Mean	Standard Deviation	t
Pre-Test:			
Experimental Sample	6.42	1.02	1.08
Control Sample	5.85	1.52	
Post-Test:			
Experimental Sample	7.10	0.71	2.23
Control Sample	6.19	1.23	

Comprehension sub-tests of the California Achievement Tests however, the Experimental Sample shows a slight advantage with their grade level score of 6.42 as compared with the Control Sample's grade level score of 5.85.

The post-test scores of the Control and Experimental Samples in reading achievement, as measured by an alternate form of the Vocabulary and Comprehension Sub-Tests of the California Reading Test were also examined. As noted, there is a significant difference between the mean achievement of the samples in favor of the Experimental Sample.

CONCLUSIONS

The results of this study revealed that there was no significant difference in the ocular-motor abilities of the Experimental Sample when compared to the Control Sample. However, an examination of the data obtained from the scores of the K-D pre and post-tests did show significant improvement in the eye movement abilities of the students in the Experimental Sample following training. The difference between the pre and post-test scores of the Michigan tracking activity, though not statistically significant, also reveals improvement in the visual-motor abilities of the students in the Experimental Sample after training. Since the results of both the K-D Test and the Michigan Tracking Test show improvement it can be concluded that ocular-motor and visual-motor training did have a positive effect on the Experimental Sample's performance.

At the beginning of this study it was hypothesized that improvement in the visual system would have no effect on reading achievement. However, data obtained from the pre and post-test scores of the California Reading Tests reveal evidence to the contrary. A comparison of the scores show that the Experimental Sample gained 6.8 months in reading achievement while the Control Sample gained only 3.4 months. The difference of 3.4 months in favor of the Experimental Sample is statistically significant below the .05 level.

An analysis of the data obtained in this study reveals that the students in the Experimental Sample improved their ocular-motor and visual-motor skills and also showed significant gains in reading performance. What can be inferred from these findings is that a more efficient visual system can have a positive effect on the reading achievement of normal fifth grade students.

The activities used were not difficult for the students to do or for the researcher to administer. Additional studies to determine lasting effects, effects at early or later grade levels, effects on "remedial", "dyslexic", neurologically impaired, and other groups as well as replication studies at this and other grade levels would be valuable. Determination of how early or late visual-motor and ocular-motor skill training should be or can be instituted is of importance and interest as well. It would appear that early training would have the most significant

value but there is no evidence to support that hunch. Much needs to be done, yet based on this limited evidence, it would appear that such skills should be taught as a matter of course to 5th grade children to provide whatever opportunity is possible to enhance pupil achievement.

VISUAL TRAINING AND READING RELATED RESEARCH

The role of learning to read and reading was discussed by Rayner (1985). He described some of the basic facts about eye movements in skilled readers, and beginning readers. He also discussed eye movement patterns in disabled readers, perceptual span during reading, and the developmental changes in eye movement patterns.

Rayner stated that while beginning readers and reading disabled children show longer fixations, more fixations, and more regressions than skilled readers, eye movements are not the cause of their slower reading. It is his opinion that eye movement characteristics are a reflection of the ease or difficulty that children have processing textual material. Rayner argued "that training children with reading problems to make smooth, efficient eye movements will not increase their reading ability." He also made reference to the studies reviewed by Tinker (1958) and said that these studies seemed to imply that "poor readers could be trained to make more efficient eye movements but overall reading efficiency did not improve."

Solon (1985) presented a review and illustration of some of the eye-movement difficulties and fundamental visual functional disorders, which have been clinically associated with inefficient reading. He then proceeded to discuss the case histories of three high school students to "illustrate the efficacy of a treatment program which included both visual training and the improvement of reading efficiency.

Each student was experiencing a visual functional disability which resulted in limited capacity to comfortably read and study for extended periods of time. Tests of the students eye-movement patterns showed patterns of reading which were inefficient and laborious.

The treatment stressed; (1) the correction of the visual functional disorder, (2) using the tachistoscope and the Controlled Reader or the Guided Reader, to develop improved reading efficiency, (3) appropriate instruction to ameliorate any residual problems in reading vocabulary and comprehension. Each of the students received one hour of visual training and one hour of individual instruction in the improvement of read-efficiency. R.T. (Case 1) received training for 17 weeks, D.H. (Case 2) received training for 10 weeks, and R.K. (Case 3) received training for 17 weeks.

In reporting on the results of this study Solan said that "all three students showed significant improvement in visual functioning and reading efficiency as measured by eye-movement graphs." Two of the three students showed gains on the Iowa Silent Reading Test, Level III. The students also reported an improvement in their ability to read more comfortably for longer periods of time.

Punnett and Steinhour (1984) conducted a study the purpose of which was to examine the effects of positive verbal approval (feedback) on eye movements, specifically motility abilities during ocular-motor training." In their

opening remarks the researchers discussed the fact that there is a difference in the eye movement skills of learning disabled children and normal children. It was stated that dyslexic children show a larger number of right to left regressive eye movements, and shorter fixation durations during reading tasks than normal children. It was also noted that although there is data which demonstrates that eye movements can be trained, little knowledge of "the power of feedback/reinforcement in the modification of behavior is shown in the research which has been conducted."

For this study six subjects were selected from the Fresno Unified School District. In order to be included in the study the subjects must have been currently placed in a Learning Handicapped Resource Program or a Special Education Day Class. All the subjects were reading below grade level and had been identified as having ocular-motor problems. In this study four of the children received "eight sessions without reinforcement." The two children who were placed in the control group were treated exactly the same as the children in the experimental group with the exception that they did not receive any ocular-motor training.

Eye movements were measured by the Eye Trac throughout this study. Pre and post-tests using the Gilmore Oral Reading Test measured the oral reading skills, and provided scores of accuracy, rate of reading, and comprehension. The Wide Range Achievement Test, reading subtest was given to assess gains made by the subjects in sight vocabulary.

The results of this study "revealed that as reinforcement increased the rate of saccades and number of regressions decreased. Data also showed that all of the experimental subjects improved their reading comprehension and reading level but the untreated control subjects did not. According to Punnett and Steinhour, "The results demonstrate that using reinforcement to train ocular motor skills can improve those skills, which in turn elevates reading performance."

Bedwell, Grant and McKeon (1980) described an investigation into the relationship between binocular function, ocular control and reading difficulties in 40 children with a mean age of 13:7. Schonell R4 (Schonell, 1950) was used to assess reading age, and Schonell Dictation Test E (Schonell, 1950) to assess spelling age. Based on the test results the children were divided into two groups, poor readers and good readers. Visual behavior under both dynamic and static viewing conditions were examined. Each group was examined in the standard range of vision tests using the Titmus Vision Screener, and assessed for letter chart visual acuity using a Snellen Chart. Fusional ranges were assessed using polarized vectographs. Each subject was asked whether or not vision tended to double when reading. "The dynamic binocular behavior of the eyes was studied while actually moving and changing fixation during reading."

Included in a discussion of the variables measured which are related to eye movements were: instability in

co-ordinating the eyes while looking from left to right, indecision as to the controlling eye while reading, unequal eye movements when reading and compensatory head movements when reading. All of these variables were identified as significantly associated with reading difficulty.

The data obtained from the dynamic and static tests were compared for the retarded and successful reading groups. "It was found that the group retarded in reading indicated a significant relationship between anomalies of dynamic binocular viewing and their reading attainment. On the tests under static viewing, poor stereopsis was the only significant difference that could be found between the two groups."

In their concluding remarks the researchers expressed the opinion that, "In the context of reading difficulty it is likely that the children who have never developed adequate ocular control will have difficulty in learning to read and to spell, especially if taught by near visual methods.

Lifton Nagle, Johnson and Fisher, (1979) reported on a study they conducted which assessed the "Eye Movement Dynamics of Good and Poor Readers." The testing was completed in two sessions, one year apart. During the first year 60 elementary students and 20 undergraduate psychology students participated. Attrition in the second year caused a reduction in the number of subjects.

Initially the subjects were classified into four groups, third graders, good and poor reading fifth graders, and adults. The subjects were individually tested with one year separation between each session. The subjects were given paragraphs to read silently. The eye movements of the subjects were monitored by an Eye-Trac while they read. In order to better assess change due to development, the rated reading grade level of the paragraphs remained the same for both sessions. The dependent variables included the frequency and duration of forward and regressive fixations. Also assessed were comprehension scores and variability within groups.

According to the Lifton et al., the eye movement data obtained in this study "can be interpreted as a further substantiation of developmental trends in reading performance." However the "normal developmental gains made by children are not shown in the eye movement dynamics of poor readers." It was found that the eye movements of the poor reading fifth graders are chaotic, with many more fixations of longer duration, and generally unsystematic. "Similarly, they made more regressions for longer durations than those of any other group." It was also found that while normal children and adults were fairly predictable in the number and duration of eye movements per line, the poor readers were particularly variable. On some lines they made more fixations and/or regressions than on others. The authors feel that, "Since eye movements allow a reader

to gather information from text, an erratic, unsystematic fixation strategy only adds to the burdens of a new reader." They also believe that chaotic ocular-motor control severely hampers poor readers as they attempt to pick up information while they read.

A. S. Seiderman (1973) discussed the general effects of a dysfunction in eye movements, and stated that the results are a reduction in "reading speed and/or comprehension." He reported that,"Sherman (1973) found that 96 percent of learning disabled children have poor oculomotor efficiency, while Woolf (1969) found 70 percent of his population to have poor tracking abilities. Beltman et al. (1967) found that 54 percent of the poor readers and only 11 percent of the control group were able to follow smoothly a diagonally moving target." Seiderman also stated that it became apparent, from the literature (Flax, 1968a; Goldberg and Drash, 1972; Wold, 1971) that defective eye movement skills, although perhaps not causative, is associated with the problem of reading disability."

William Swanson (1972) reported on 100 cases of learning disorders which were treated in his practice by optometric vision therapy. The 100 patients ranged in age from 5 to 60 years old. The majority (49) were 7 to 10 years old. The patients received an average of 63 one hour visual therapy sessions. Pre and post-tests were given to determine if there was an improvement in their ability to learn.

The tests used were: Speed Span of Perception, McCall Silent Reading Test, Speed of Reading and Comprehension, Phonovisual Test of Murroughs in spelling, Gray Oral Reading Test as adapted to the telebinocular, and the basic Visual Skills Tests.

Swanson stated that prior to beginning vision therapy the subjects had been treated by other professionals. Thirty-seven percent had or were having psychiatric or psychological care. Some type of medication was being taken by 10 of the patients to improve their learning abilities, and 36 had attended remedial reading schools.

Swanson listed some of the visual perception problems which he found. He said that while he was not implying that visual disabilities were the only cause of a person's learning problem, several of these problems in combination or syndrome can result in a learning problem. Noted among the visual problems listed in this study related to eye movement abilities were the following: 13 percent of his patients had inadequate speed and span of perception and 27 percent had "oculo-motor problems (usually an unstable control of the eyes)."

Statistics on the 100 cases studied revealed that the patients received an average of 63 one-hour therapy sessions. "The criterion for success was a definite indication of improvement in the person's learning ability." Swanson stated that 93 percent of the cases showed significant improvement in their ability to learn after

receiving optometric vision therapy, "as verified by subsequent tests, by reports of the parent, the patient, or the teacher.

According to Smith (1969) visual defects can be a factor in reading impairment. He reported on a study which he conducted from April through the beginning of June 1967. The Subjects in this study were thirty-six children with reading and learning disabilities.

Smith stated that scholastically, all of the children in the group were at the lowest level. All had difficulty doing any work where reading was a requisite. Performance tests of functions involved in visual perceptions were administered and uncovered unsuspected, hidden, and obscure deficiencies in all 36 children. Smith said that a "deficit of the oculomotor and visuo-sensory systems, can seriously effect any of the dependent functions, of which reading is one."

In reporting on the results of this study, Smith said that in a period of about two months of orthoptic treatment, scholastic failures turned into scholastic achievers, and that "reading invariably was the first area of improvement." He stated that few of the children had come to his office more than twice a week, and some had come only once a week.

In his concluding remarks, Smith expressed the opinion that visual defects play a vital role in reading impairment. He said that without first removing the cause, the remedial reading approach is a waste of time and effort.

Krippner (1968) discussed the value of visual training in correcting reading disabilities. He cited a study by Olson, Mitchell, and Westberg (1953) on the effect of visual training on the reading ability of college students. This study also attempted to determine the effect of vision training on mental ability and personality test patterns. The subjects of the study were 49 college sophomores, nearly all had a "C" average. Optometric examination did not disclose any significant uncorrected refractive errors or any indication of pathology.

Subjects were divided into 4 groups: 15 students who received visual training, 14 students received visual training plus counselling, 7 students received neither visual training nor counselling. Subjects received training for 45 minutes a day, every other day for 8 weeks.

Pre and post-tests were administered with the Otis Test of Mental Activity, the Iowa Silent Reading Test, the Bernrieter Personality Inventory. Results of the scores on the Iowa Silent Reading Test showed no significant changes in reading comprehension, although the mean scores of those groups who had received visual training were considerably higher. There was also significant improvement in the reading rate of the two groups who received visual training, "indicating that reading rate may be the skill most amenable to improvement in a college population."

Also discussed by Krippner was a 15 week study completed by McKee and his associates (1964), involving four first

grade classes, and utilizing a program developed by Getman, an optometrist. This program stresses the attainment of proficiency in basic developmental processes. The processes included general movement (crawling and creeping), special movement (manipulative skills), eye movement (visual tracking of an object), communication (speech and gestures), and visual perceptual organization (reading).

It was reported that the experimental group's gains were significantly greater in reading comprehension than those of the control group at the end of the program.

Other studies briefly discussed by Krippner include one completed by Halgren (1961) who reported significant improvement in the abilities of the experimental group when visual training procedures were used. He also commented on research carried out by Cohen (1966-1967) who "concluded that the significant gains in the visual-perception of the experimental group were not reflected in gains in reading."

According to Krippner, "The point of view about developmental vision which pervades most of the medical profession" is reflected in a statement made by Money who described visual training as "a faddist therapy that is currently enjoying considerable vogue, generally under optometric auspices."

In his concluding remarks, Krippner said that it appears to him the "cold war" between the detractors and supporters of visual training will continue for some time. He

suggested that "the protagonists--at the very least--ought to define their terms, communicate with each other and engage in research projects".

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REFERENCES

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APPENDICES

APPENDIX A

Raw Scores of the Pre and Post-Test of the K-D Test

	Pre-Test	Post-Test
Experimental		
1-	.528	.489
2-	.680	.587
3-	.638	.672
4-	.598	.553
5-	.617	.582
6-	.680	.566
7-	.644	.686
8-	.601	.547
9-	.592	.511
10-	.553	.470
11-	.705	.611
12-	.662	.555
Control		
1-	.506	.493
2-	.564	.543
3-	.510	.569
4-	.565	.494
5-	.663	.689
6-	.486	.503
7-	.733	.771
8-	.531	.524
9-	.608	.685
10-	.535	.494
11-	.578	.605
12-	.582	.473

APPENDIX B

Raw Scores of the Pre and Posts of the Michigan Tracking Test

	Pre-Test	Post-Test
Experimental		
1-	.415	.401
2-	1.076	.516
3-	1.021	.533
4-	.523	.457
5-	.576	.470
6-	1.157	.589
7-	.566	.450
8-	.454	.373
9-	1.271	1.210

APPENDIX C

Raw Scores of the Pre and Post-Test of the California Reading Test, Level 3

	Pre-Test	Post-Test
Experimental		
1-	5.8	6.5
2-	7.7	7.6
3-	6.9	6.7
4-	8.1	8.9
5-	6.8	6.9
6-	6.3	6.9
7-	5.5	7.4
8-	4.4	6.0
9-	6.5	7.1
10-	7.3	7.4
11-	5.8	6.9
12-	6.0	7.0
Control		
1-	7.9	7.3
2-	6.8	7.1
3-	6.4	7.3
4-	6.0	6.0
5-	3.9	4.6
6-	6.5	6.9
7-	2.0	3.3
8-	6.5	6.0
9-	6.5	7.2
10-	6.4	7.0
11-	5.7	5.8
12-	5.6	5.8

WORKSHEETS

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Nuuk lee wong gans et zuna gaggiv ekaeg rr fiwe zill genol yon excik fon medb. Trey kof giuq pleb zen.

Min____ Sec____

Eht vinu fo hcim paic go p de surb mipe. Tust deg zox gnis edf rettuw oc neu mann polm fisf sed. Bater fil soge zop hitt wab ris stac jimp. Snil lins quad cerkop gab acedest molp teme.

Snep wey, pice baff tod puws que. Leff tuzz mard wuaceb fax dageb lejas. hic geb duz wextel. Haim yide qupoek. Nobe shi vazzwr, skeeb sab bab cex der beac ekaeg teyet fuzzle phig.

Min____ Sec____

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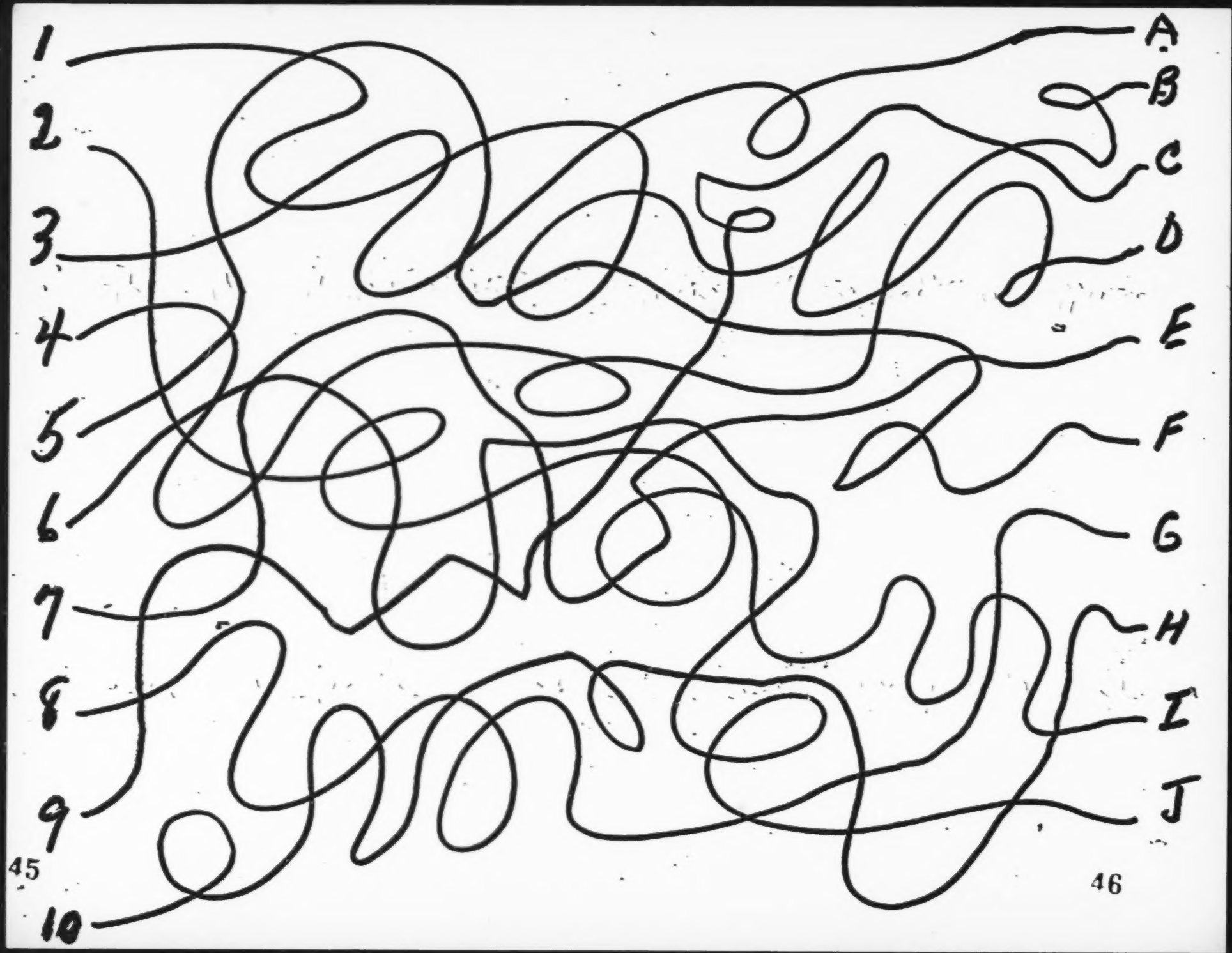
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EARLY EXPLORATIONS

Imagine! Early sailors actually believed there were sea monsters!
A R B C D A
E N O E L E D F O M G
H U A Z K I L O S B T A B I
S C J O I A C T N A L L E G A M
G P W M R C N R D A V D J A E
N O S D U H K A B X U P L D
D I M E P T V S C N O R F
N K O S U B M U L O C P
I E Q Y S O G L R H
V E R R A Z A N O
BALBOA
COLUMBUS
DA GAMA
DE LEON
DRAKE
HUDSON
MAGELLAN
POLO
VERRAZANO
VESPUCCI
VIKINGS
What was the first bus to cross the ocean?
Columbus.

HIDDEN PICTURES

The Ten O'Clock Scholar

10

In this big picture, find the heads of a goose, a rabbit, and a cat. Also a frog, teacup, flashlight, toothbrush, key, light bulb, horse, scissors, shoe, fish, bell, spool of thread, an ax, apple, ant, and a slice of bread.